

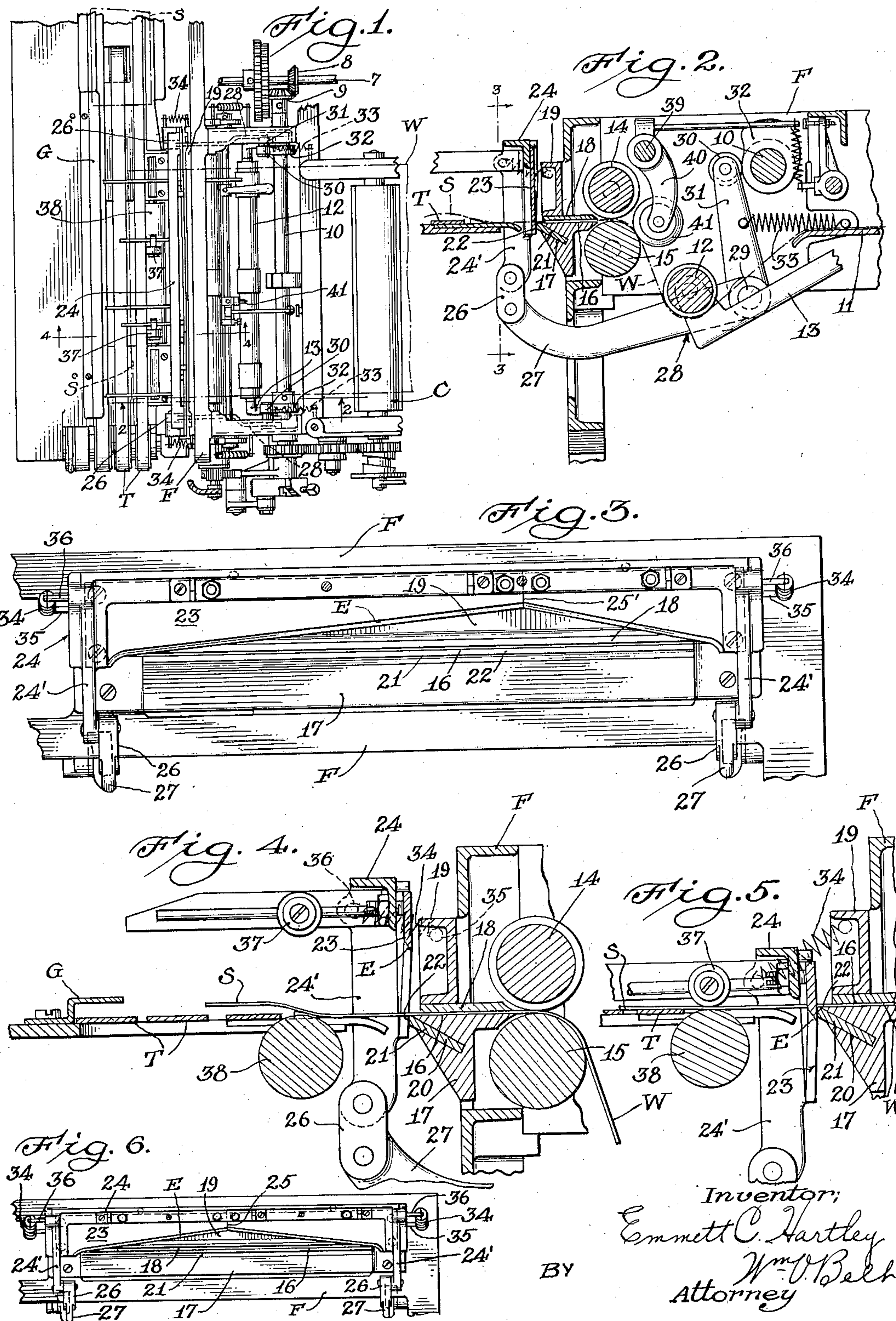
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PRINTING MACHINE

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## PRINTING MACHINE

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This application is a continuation in part of my co-pending application, Serial No. 404,123, filed November 1, 1929, issued as Patent No. 1,955,806, April 24 1934.

5 This invention relates to machines for printing and addressing sheets forming bills, statements, notices and the like of the kind used by public service, insurance and similar companies. These sheets are usually long and narrow and comprise  
10 body portions and one or more stubs separated from each other and from the body portions on scored lines. One of the objects of my invention is to sever such sheets from a continuous web so that the severed sheets may be successively  
15 passed through a machine to have printing or other operations performed thereon. These sheets usually have certain constant information printed on the back thereof and other constant information printed on the face thereof and  
20 variable information, such as the names and addresses of customers or clients, is also printed on the face of the sheets. Machines of this kind are shown in my co-pending applications, Serial No. 404,123, filed November 1, 1929, issued as  
25 Patent No. 1,955,806, April 24, 1934 of which this application is a continuation in part, and Serial No. 459,599, filed June 6, 1930.

Sheets of the kind referred to above are usually of a greater length than width. I, therefore,  
30 provide a wide web of a width equal to the desired length of the sheets so that the sheets may be successively severed from the web at spaced intervals on the web equal to the desired width of the sheets. A far greater number of sheets  
35 may be severed from the web in this manner than when the sheets are severed from a web of a width equal to the desired width of the sheets and therefore by providing a wide web, as described, frequent replacement of the web is  
40 avoided. Therefore, another object of my invention is to sever sheets from a wide web at intervals spaced equally to the desired width of the sheets.

Still another object is to sever the sheets from  
45 the web without tearing, creasing or otherwise mutilating the web and an ancillary object is to sever the sheets from the web by cooperating cutter members coacting with a shear action.

A further object is to so mount the cutter members that they will coact to be self-sharpening,  
50 that is to say, so that relative movement of the cutter members will effect sharpening of the shearing edges.

A still further object is to yieldingly support  
55 at least one of the cutter members to avoid the

likelihood of damage to the cutter members in event an obstruction is placed between the cutting edges of the members.

It is sometimes desirable to provide a web of a width greater than the desired width of the  
5 sheets as, for example, a web of twice the width of the sheets may be provided and this web may be divided medially to provide two sheets of equal width, and a still further object of my invention is to sever the sheets from a divided web  
10 in such a manner that one sheet will be freed from the web prior to the other so that the sheets may be successively fed to a printing position or the like in the machine with an interval there-  
15 between to thereby facilitate printing or like operations thereon.

Other and further objects will be apparent from the following description wherein reference is made to the accompanying drawing illustrating a selected embodiment of the invention and in  
20 which

Fig. 1 is a fragmentary plan view of a machine including my novel sheet severing device;

Fig. 2 is a transverse sectional detail view, drawn to an enlarged scale, taken substantially  
25 on the line 2—2 on Fig. 1;

Fig. 3 is a front elevation;

Fig. 4 is a transverse sectional detail view, drawn to an enlarged scale, taken substantially  
30 on the line 4—4 on Fig. 1 and wherein the severing device is illustrated in its position at the start of a severing operation;

Fig. 5 is a fragmentary detail view, similar to Fig. 4, illustrating the severing device in its  
35 position at the completion of the severing operation; and

Fig. 6 is a view similar to Fig. 3 showing another form of the invention.

My invention may be used advantageously in connection with machines of the kind disclosed  
40 in my previously referred to co-pending applications to which reference may be made for a detailed description of the machines. The illustrated machine which is of the kind shown in my referred to co-pending applications includes  
45 a drive shaft 7 having a bevel gear 8 fast thereon and meshed with a bevel gear 9 fast on the shaft 10 journaled in the frame F of the machine and extended transversely across the frame below the web W which is passed longitudinally through  
50 the frame. The web may be directed through a printing couple C so that impressions may be made thereon at spaced intervals or it may be directly passed to a ledge 11 and then below a  
55 looper roller 12 rotatably mounted on a rocker

13 suitably supported in the frame F and adapted to be reciprocated to alternately form and release a loop in the web W. From the looper roller 12 the web is directed between a pair of cooperating  
 5 feed rollers 14 and 15, journaled in the frame F, and thence through the slot 16 defined between the horizontal ledge 17 and the plate 18 disposed thereabove. The plate 18 is carried by a bar 19  
 10 extending transversely of and secured to the frame F above the web W. Sheets S are severed from the web at spaced intervals therealong by my novel severing device, which will be described more fully hereinafter, and the severed sheets are  
 15 deposited in the sheet guideway G having feed tapes T therein which carry the sheets S to a printing or other operative position in the machine. The machine as thus far described is merely exemplary of the kind with which my invention may be used for the invention is not  
 20 limited to use with the details of construction thus far described.

A pocket 20 is provided in the ledge 17 below the top surface thereof and this pocket extends into the ledge at an acute angle. A stationary  
 25 knife or cutter member 21 is mounted in this pocket and has a cutting edge 22 at the uppermost end thereof and the forwardmost surface of this knife is relieved in a substantially vertical plane away from the cutting edge. A vertically  
 30 reciprocal knife 23 is mounted to cooperate with the knife 21. The cutting edge E of this knife is inclined upwardly from the outer ends thereof and in the form of the invention shown in Fig. 6 the apex 25 is located medially of the ends  
 35 while in the form of the invention shown in Fig. 3 the apex 25' is located at one side of the medial part of the longitudinal extent of the knife 23.

The knife 23 is mounted in a supporting frame 24 having depending arms 24' at opposite ends  
 40 thereof. Links 26 are pivotally connected to the lower ends of the arms 24' and to the outer ends of arms 27 of the bell cranks 28 pivotally mounted at 29 on the frame F. Rollers 30 are rotatably mounted at the outer ends of the arms 31 of the  
 45 bell cranks 28 and are held against peripheral cams 32 fast on the shaft 10 by springs 33. Springs 34 have corresponding ends thereof connected to spring anchors 35 on the bar 19 and spring anchors 36 on the frame 24, and these  
 50 springs 34 act on the frame 24 to hold the knife 23 in engagement with the forward end of the knife 21 as illustrated in Figs. 2, 4 and 5.

The feed rollers 14 and 15 are driven from the shaft 10 and may therefore be operated in timed  
 55 relation with the movable knife 23 which is operated by the cams 32 on the shaft 10. Therefore, when the feed rollers 14 and 15 have rotated to feed a predetermined length of the web W past the cutting edge 22 of the stationary  
 60 knife 21, the rises on the cams 32 engage the rollers 30 on the arms 31 and pivot the arms 27 of the bell cranks 28 downwardly to thereby move the frame 24 downwardly from the position shown in Fig. 4 into the position shown in Fig. 5. At  
 65 the time the frame 24 starts to move downwardly and when the knife 23 engages the web W rotation of the feed rollers 14 and 15 is interrupted so that the feeding movement of the web past the knife edge 22 is interrupted and the feed rollers  
 70 are firmly held against rotation to clamp the web. At this same time the frame 13 moves downwardly so that the roller 12 acts to form a loop in the web W as illustrated in Fig. 2.

The cutting edge 22 is straight but the cutting  
 75 edge E is inclined as has been described and

therefore as the frame 24 and consequently the knife 23 move downwardly the outer ends of the cutting edge E first move into cooperating relation with the cutting edge 22 and as the knife 23 continues to move downwardly the cutting  
 5 edge E cooperates with the edge 22 to sever the web progressively inwardly from the side edges thereof and such severance of the web progresses inwardly to the apex in the cutting edge E. By reason of the progressive cutting inwardly from  
 10 the edges, the cutting action is like that of a shear which serves to effectively sever the web without crumpling or tearing it.

Subsequent to the time the apex 25 finally severs the sheet, the rollers 30 on the arms 31  
 15 move onto the drops of the cams 32 and therefore the springs 33 may act on the arms 31 to effect raising of the arms 27. The springs 34 are stretched when the frame 24 moves downwardly and when the arms 27 start to move upwardly  
 20 these springs serve to return the frame 24 to its upper position illustrated in Fig. 4.

The forward surface of the knife 21 is disposed in a substantially vertical plane and the rear surface of the knife 23 also lies in a substantially  
 25 vertical plane and after the cutting edge E moves past the cutting edge 22, the sliding of these flat surfaces on each other effects constant sharpening of the knife edges whereby the cutting edges are maintained sharp and this insures a  
 30 good cutting action.

When the apex is located as shown in Fig. 6 the final severance of the sheet from the web occurs medially in the transverse extent of the web, and as soon as the sheet is severed from the  
 35 web the rollers 37 in the frame 24 move into clamping relation with the roller 38 mounted in the frame F immediately forward of the ledge 16 and the rollers 37 remain in clamping relation with the roller 38 for a sufficient time to move  
 40 the severed sheet out onto the feed tapes T in the sheet guideway G. Thus the rollers 30 do not move onto the drops of the cams 32 until after an elapse of a sufficient time to permit the roller 38 which is driven from the shaft 10 to  
 45 dispose the severed sheet on the tapes T.

A rod 39 is mounted in the frame F and extends transversely thereacross. Arms, such as the arm  
 40 40, may be mounted thereon at spaced intervals and these arms carry discs 41. The discs 41 bear  
 50 against that part of the web passing over the roller 15 from the roller 12 and the peripheries of some of these discs are notched to score the web to thereby divide a sheet severed from the web into a main body portion and one or more stubs.  
 55 The disc 41 illustrated in Fig. 2 is mounted medially of the width of the web and the periphery thereof is sharpened to provide a cutting edge and this cutting edge cooperates with the roller 15 to divide the web medially. If, however, the disc  
 60 is located in a position other than medially of the web, it is obvious that it will divide the web longitudinally into unequal sections.

In the present instance wherein the sharpened disc 41 is located medially of the web to divide  
 65 it longitudinally into equal sections, the apex 25' in the cutting edge E, as illustrated in Fig. 3, is located to the right of the medial part of the web for in the arrangement illustrated the feed tapes T are driven to move through the guideway G to  
 70 the left in the machine, as viewed in Fig. 3. Therefore, when the apex in the cutting edge 24 is located as shown in Fig. 3 the sheet to be cut from the left hand half of the web is completely severed from the web prior to the time the sheet  
 75

is severed from the right hand half of the web. Thus the sheet severed from the left hand half of the web may be picked up by the feed tapes and carried forwardly for a short distance prior to the time the sheet severed from the right hand side of the web is deposited on the tapes, and in this way the sheets cut from each half of the web are fed along the feed tapes in spaced relation with an interval therebetween and this facilitates control of the sheets to permit printing or other operations to be performed thereon. It will be understood from the foregoing that when the web is divided longitudinally the apex in the cutting edge of the movable knife will be so located that the sheet first severed from the web will be that which will be picked up and carried away by the conveyor mechanism, which in the present instance is the feed tapes T, prior to the time the sheet last severed is picked up and this insures an interval between sheets so severed from the web.

The severing device or cutting mechanism of this invention operates so that the cutting members coact with a shear action and consequently the web is cleanly severed without tearing, crumpling or the like. Moreover, the reciprocation of the knives of the severing device relative to each other effects self-sharpening of the edges and maintains a clean cut edge and this avoids replacement of the knives from time to time. Furthermore, the severing device may be operated in timed relation with the feeding means for advancing the web and therefore sheets of a predetermined and uniform width may be severed from the web. Since the knives of the severing device coact with a shear action it is possible to sever a web of relatively wide width and therefore the web may be furnished in the width desired for the length of the sheet which is particularly advantageous in the case of utility bills and the like.

While I have illustrated and described a selected form of my invention it is to be understood that this is capable of variation and modification and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims:

I claim:

1. A severing device including a supporting member, a knife mounted in said supporting member, a frame, means supporting said frame for movement relative to said knife, a knife mounted in said frame to be movable therewith and having the cutting edge thereof inclined inwardly from its ends and away from the cutting edge of the knife mounted in the supporting member, means for moving said frame to move the knife therein relative to the knife in said supporting member whereby the inclined cutting edge of the knife in the frame progresses across the cutting edge of the knife in the supporting member to sever a web or the like between the knives with a shear action, the end portions of the knife in the frame engaging the knife in the supporting member when the cutting edges of the knives are separated and successive portions of the knife in the frame behind the cutting edge thereof engaging the knife in the supporting member during movement of the knife in the frame toward the knife in the supporting member, and means yieldingly holding the knife in the frame against the knife in the supporting member whereby the knife in the frame is guided in its movement by the knife in the supporting member.

2. A severing device including a fixed knife, a frame, means supporting the frame for movement relative to said knife, a knife mounted in the frame to be movable therewith and having the cutting edge thereof inclined inwardly from its ends and away from the cutting edge of the fixed knife, the inclined cutting edge of the knife in the frame progressing across the cutting edge of the fixed knife to sever a web or the like between the knives with a shear action, the end portions of the knife in the frame engaging the fixed knife when the cutting edges of the knives are separated and successive portions of the knife in the frame behind the cutting edge thereof engaging the fixed knife during movement of the knife in the frame toward the fixed knife, means yieldingly holding the knife in the frame against the fixed knife whereby the knife in the frame is guided in its movement by the fixed knife, and means for moving said frame to move the knife therein relative to the fixed knife, the moving means limiting the movement of the knife in the frame away from the fixed knife to prevent the end portions of the knife in the frame from disengaging the fixed knife.

3. A severing device including a supporting member, a knife mounted in said supporting member and having the shearing edge thereof supported beyond said supporting member, a frame, means supporting said frame for movement relative to the shearing edge of said knife, a knife mounted in said frame to be movable therewith and having the shearing edge thereof adapted for cooperation with the shearing edge of the knife in said supporting member inclined upwardly away from the ends thereof, said knife in said frame being engaged with the shearing edge of the knife in said supporting member so that the ends of the knife in said frame are engaged with the knife in said supporting member when the shearing edges of the knives are separated and so that the intermediate part of the knife in said frame progressively engages the shearing edge of the knife in said supporting member as the knife in said frame is moved toward the knife in said supporting member, means acting on said frame and yieldingly urging the knife in said frame against the shearing edge of the knife in said supporting member, the engagement of the knife in said frame with the shearing edge of the knife in said supporting member guiding said frame and the knife therein during movement of said frame and the knife therein, and means for moving said frame to move the knife therein relative to the shearing edge of the knife in said supporting member to shear a web or the like passed between the separated shearing edges of said knives.

4. In a machine of the class described, a severing device, means for feeding a web to said severing device whereby sheets may be severed from said web, said severing device including a stationary knife, a movable frame, a knife mounted in said frame to be movable relative to the stationary knife, means for moving the knife in said frame relative to the stationary knife to sever sheets from the web, a sheet moving device in said machine, and means on said frame and movable therewith toward and away from the sheet moving device and adapted to clamp the severed sheets in engagement with the sheet moving means after the sheets have been severed from said web to thereby insure feeding of the severed sheets away from the severing device.

5. In a machine of the class described, a sever-

ing device, means for feeding a web to said severing device whereby sheets may be severed from said web, said severing device including a stationary knife, a movable frame, a knife mounted in said movable frame to be movable relative to the stationary knife and having the cutting edge thereof inclined upwardly from its ends away from the stationary knife whereby the shearing action of said knives progresses inwardly from the edges thereof and final severance is effected when the apex in the inclined edge passes the stationary knife, means for moving the knife in said frame relative to the stationary knife to sever sheets from the web, a sheet moving device in said machine, and means on said frame for clamping the severed sheets in engagement with the sheet moving means after the sheets have been severed from said web, said clamping means clamping the sheets in engagement with the sheet moving means subsequent to the passage of said apex past said stationary knife in a severing operation.

6. In a machine of the class described, a severing device, means for feeding a web longitudinally to said severing device whereby sheets may be severed from the web, said severing device including a stationary knife, a movable frame, a knife mounted in said frame to be movable relative to the stationary knife, means for moving said frame to move the knife therein relative to the stationary knife to sever sheets from the web, a sheet moving device in said machine, means on said frame for clamping the severed sheets in engagement with the sheet moving means after the sheets have been severed from said web, conveyor means in said machine to receive sheets from the sheet moving means, and means for operating said conveyor means to carry the sheets away from the moving means in a direction transverse to the extent of the web and longitudinally of the sheets.

7. In a machine of the class described, a severing device, means for feeding a web to said severing device whereby sheets may be severed from said web, said severing device including a stationary knife, a movable frame, a knife

mounted in said movable frame to be movable relative to the stationary knife and having the cutting edge thereof inclined upwardly from its ends away from the stationary knife whereby the shearing action of said knives progresses inwardly from the edges thereof and final severance is effected when the apex in the inclined edge passes the stationary knife, means for moving the knife in said frame relative to the stationary knife to sever sheets from the web, a sheet moving device in said machine, means on said frame for clamping the severed sheets in engagement with the sheet moving means after the sheets have been severed from said web, said clamping means clamping the sheets in engagement with the sheet moving means subsequent to the passage of said apex past said stationary knife in a severing operation, conveyor means in said machine to receive sheets from the sheet moving means, and means for operating said conveyor means to carry the sheets away from the moving means in a direction transverse to the extent of the web and longitudinally of the sheets.

8. In a machine of the class described, a severing device, means for feeding a web to said severing device, means for dividing said web longitudinally into sections, means for operating said severing device to sever sheets from said web subsequent to the division thereof into sections, and conveying means for carrying the sheets severed from said web away from said web and severing device, said severing device including a cutting edge inclined inwardly from the ends thereof to an apex and away from the cutting edge on a cooperating knife, the apex in said cutting edge being located at one side of the division in said web whereby a sheet is severed from one section of said web and picked up by said conveying means prior to the time a sheet is severed from the other side of said web and picked up from said severing device whereby sheets so severed from said web move along said conveying means in spaced relation with each other.

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